Commentary

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Common goals, shared risk and a just culture: human factors lessons from the front line

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The success of the Defence Medical Services treatment of severely injured service personnel over the last decade has been well documented in both the medical literature and the media. Statistically significant, year-on-year improvements in survival have been demonstrated[1] and these can be summarised as follows (See Figure 1):

- Over the course of the decade, an estimated 265 casualties survived injuries that would probably have been fatal at the start of the conflict, owing to improvements in the care during this period;
- 572 casualties survived despite injuries classed by the NHS as 'life-threatening';
- 38 casualties survived with injures classed by the NHS as 'unsurvivable'.

The innovations and improvements that have been associated with this period, such as pre-deployment training,[2] damage control surgery,[3] the medical emergency response team,[4] massive blood transfusion protocols[5] and 'right turn resuscitation',[6] cannot explain all of the success. After all, many of the key features of trauma management used in Iraq and Afghanistan were well-known and already being practised in many other parts of the world.

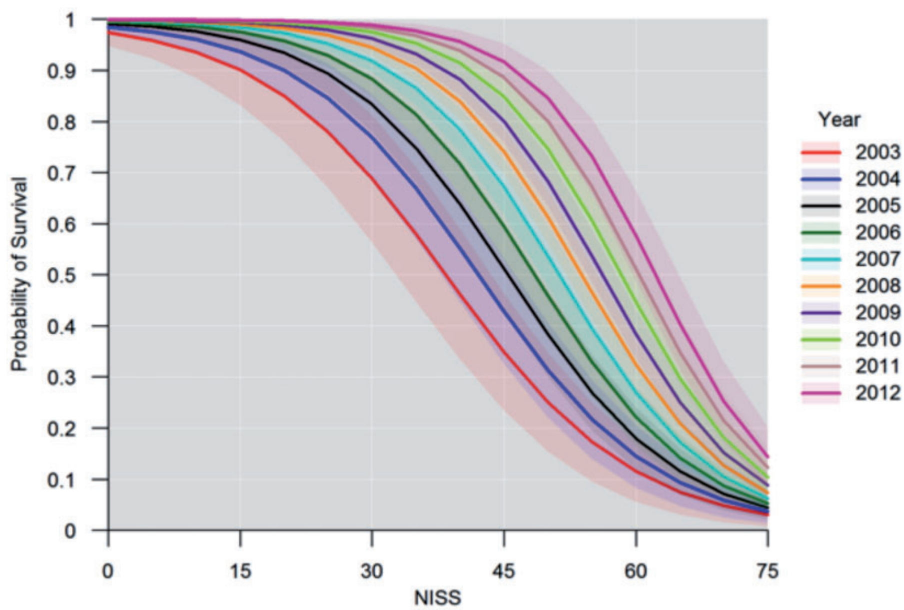
So could the explanation for the steady improvement in outcome be due to a subtler but more profound effect? The sort of effect that is hard to see and even harder to measure? The concept of human factors has been understood for years but only recently has its importance in healthcare been recognised.[7,8] The basic tenets of human factors are well established and include clear goals, followership, leadership, teamwork, good communication, checklists and well-designed pathways. Even though all NHS institutions and health professionals espouse these principles, the same mistakes keep being made. Also known as 'willful blindness', the institutional failure to react to concerns from staff on the ground and correct structural problems was a common theme in Bristol paediatric cardiac surgery in the 1980s and the Mid Staffordshire and Morecombe Bay Hospital Trusts in the 2000s. The World Health Organization checklist introduced by Haynes et al.[9] showed a significant reduction in never events in theatre. It is one of the best examples of how a human factors-designed system can directly lead to a measurable improvement in survival.

There are many reasons why it is harder to demonstrate the same degree of improvement in trauma care in the NHS compared with Camp Bastion. This is related in part to the heterogeneity of the patients and the multiplicity of service providers. However, the fact that it is difficult to directly compare the two should not preclude trying to emulate some of the best aspects of care that evolved in the Defence Medical Services. The emphasis on human factors both during pre-deployment training and reiterated during the tour[10] was undoubtedly a significant part of the reason behind the continual improvement and can be summed up by the three tenets: 'Common Goals, Shared Risk and a Just Culture'.

Common goals

One of the overriding themes of the military during deployment is the knowledge that there is a common goal: a mission with clear objectives so that with hard work, sacrifice and team work, the battle will be won. This was what Churchill referred to as blood, toil, tears and sweat. So, it was for the Defence Medical Services. Even before setting off from the UK, we trained with one clear goal in mind – to provide the

Figure 1. Plot of predicted probability of survival of UK combat casualties from Iraq and Afghanistan by New Injury Severity Score value for each year. Shaded regions indicate the 95% confidence intervals for the predicted values obtained from the logistic regression model. Reproduced with permission from Penn-Barwell et al.[1]



very best damage control surgery to injured service personnel and rapidly evacuate them back to the UK for definitive care. We also planned that all other patients who presented to UK medical facilities were treated to the same high standard before repatriation to their own health systems.

This was the same goal for the deployed medical director, the engineer, the intensive therapy unit nurse, the defence academic in the UK analysing the data and the helicopter pilot tasked with retrieving casualties from the battlefield. This simple objective helped to maintain focus for all staff during the trials and tribulations of a stressful tour.

A busy UK general hospital is clearly a very different environment from the Camp Bastion medical facility where everyone lived and worked together for months and each member of the team was known personally. In the NHS, our multidisciplinary teams are constantly changing to cover shifts and staff shortages. Therefore, instead of taking time to identify strengths and build common goals, the beginning of each day is spent introducing and assimilating new members of staff into teams just to fill a gap. The following day brings new personalities and the process of team-building is repeated. The Francis inquiry into the failings at Mid Staffordshire Trust identified how spreading staff thinner and thinner to cover gaps on the wards ultimately became self-defeating. It should become a priority to concentrate on maintaining small, stable teams tasked with specific jobs, rather than simply filling gaps. With stability, each person not only learns to perform their tasks better, but also develops a mutual understanding and respect for the roles and skills of the others. The team leaders should be capable of identifying and communicating a common goal. Only then can the team achieve more than the sum of its parts.

Shared risks

Afghanistan was a new challenge when it came to flying helicopters. A hot, dusty, land-locked country at an altitude of 3000 ft generates the sort of aerodynamics that meant helicopters could barely fly and pilots could barely see when coming into land (Figure 2). But the pilots and their crew accepted the challenge to fly into a firefight to collect injured servicemen or women even if, at times, the visibility was so poor they were flying almost blind. In addition, the infantry commanders accepted their role to find, clear and mark a landing site so the pilots could find them even if that put them in a tactically exposed position. Both groups were going well beyond their comfort zone, but by discussing and sharing those risks, they could modify their accepted standard operating procedures. By doing so, they optimised the care for the injured personnel while minimising their own risks.

Figure 2. The high altitude, dust and lack of ambient light made flying helicopters extremely difficult. Moreover, the pilots had to cope with extremely poor visibility when landing to rescue injured personnel. By discussion and compromise the Chinook pilots, the medical emergency response team and the infantry soldiers on the ground modified their usual standard operating procedures to optimise the care for the person injured on the battlefield while minimising their own risks.

In many ways, 'Shared Risk' is the guiding principle that allowed damage control surgery to evolve. First described by Rotondo et al.[11] in response to the surge in gun crime in American cities, they advocated 'physiological surgery' over the traditional approach. Traditionally, anaesthetists would take time to stabilise a patient prior to an operation with meticulous monitoring and optimal post operative analgesia; theatre staff would assemble the equipment and prepare the theatre environment before the surgeons performed operations on stable patients. However, improvements in pre-hospital transfers meant trauma patients were now arriving alive with previously 'unsurvivable' gunshot wounds. These patients not only had significant anatomical injuries but they were also hypothermic, coagulopathic and acidotic (the so-called deadly triad). Prolonged surgery simply worsened these parameters, and it was the downward spiral of this triad that would then kill them. Consequently, damage control surgery evolved to address this problem – do surgery to stop bleeding and limit contamination, then 'get out'. Intensive care could then correct the deteriorating physiology, after which, the surgeons could bring the patient back to theatre for a definitive operation. Surgeons, anaesthetists and theatre staff had to accept that this new approach changed their normal practice and, by implication, theoretically would increase the risk to their patients. However, by discussing these risks, modifying their usual procedures and developing new guidelines they were actually sharing those risks and the survival rates started to improve.

The conflicts in Iraq and Afghanistan from 2002 onwards brought a new set of challenges for the British and American military medical teams. The patients were arriving alive at hospital with injuries never described before because of advances in body armour, pre-hospital care and rapid evacuation. In addition, they were thousands of miles from definitive treatment and the provision of all the relevant specialties was impractical. The benefits of optimal, preoperative stabilisation had to be balanced with the risk of the patient exsanguinating. The <C> of catastrophic haemorrhage was placed before airway, breathing, chest compressions in the resuscitation algorithm. At Camp Bastion, the term 'right-turn resuscitation' was coined to describe how the most haemodynamically unstable patients were immediately turned right at the hospital entrance, directly into the operating room rather than into the emergency department resuscitation room. So within minutes of the helicopter touching down, the surgeons could start a laparotomy to control haemorrhage even though the anaesthetists had barely begun inserting intravenous lines. The patient would go to surgery so fast that a primary survey had not been completed. So, The entire emergency department team would then follow the patient in their 'right turn' to theatre and the operating room would become a glorified resuscitation room. Each team accepted a compromise to their usual working practice and the concomitant risks that entailed, but by jointly developing new pathways, those risks were shared and the care of the patients improved significantly.

At times, the surgeons would open and pack the abdomen, clamp the iliac vessels to control bleeding and then pause while anaesthetists secured their tubes and lines and prepared for massive transfusion. Then, still under the control of the emergency department team leader, the patient, with their abdomen open, would be wheeled into the computerised tomography scan for all their injuries to be identified. When the patient returned to theatre, the surgery would be restricted to the bare minimum. Surgeons, anaesthetists, emergency department teams and theatre staff were all signed up to the 'Damage Control' philosophy and accepted that the remainder of the operation was better performed later when the physiology had improved, the temperature had normalised and the coagulopathy had been corrected.

The scenario described above was common, with 40 unit transfusions a regular occurrence. However, the pace of treatment was now so fast that it was virtually impossible to inform the whole team of what was happening and what needed to be done. It required a new system of communication.[12] Called the 'Trauma World Health Organization' (after the World Health Organization checklist), it allowed all the teams to communicate quickly, concisely and at agreed intervals, so that as the injuries were identified, the entire team would be informed, new plans rapidly formulated and every member of the team empowered to perform to the best.[12]

Many of the techniques that were routinely employed by the UK military medical services, such as damage control surgery, 'right-turn resuscitation' and enhanced communication, have now been incorporated into civilian trauma practice. However, the concept of considering 'Shared Risk' between the patient and the various teams caring for them remains a novel one. In NHS practice, the 'risk' is that the care provided by an individual team may appear different from an accepted gold standard – for example, surgery starting before the anaesthetist has arterial and central lines in place. However, taken as a whole package, with the problems discussed in advance and new pathways agreed, the risk is shared between several different specialties, overall care improved significantly.

Adopting this 'Shared Risk' approach as a decision-making tool could form the basis of discussions to look at established problems differently especially where multiple specialties or professionals are involved. It could help develop new pathways for many different areas of patient care.

Just culture

In the fast-moving environment of blood and trauma, with emotions stretched and teams changing every three to six months, how could improvements be made? Moving medical opinion is usually like turning a battleship around. Yet when things did not go to plan, lessons learned risked being lost. So a 'Just Culture' arose. The principle was developed in the aviation industry in response to repeated fatal accidents from the 1950s to 1970s[13] and was based on the premise that by encouraging open reporting and discussion of all adverse events safety could be improved.[14,15]

Although the military hierarchy is thought of as a sharp pyramid, a flat structure developed at Camp Bastion. All patients were discussed twice a day, at a meeting (the board round) which everyone attended; the medical director, surgeons, anaesthetists, intensivists, nurses, physiotherapists, the padre and the Aeromedical Evacuation team were all present. The 'Just Culture' encouraged everyone to speak, but they also knew when to listen, because the 'common goal' was understood and the risks shared.

As we lived in each other's pockets – working, eating and exercising together[16] – we had the confidence and the psychological safety to speak up either at the board round or at some other point in the day. Many a time, the theatre support worker (a private) would make a suggestion to improve theatre efficiency to the consultant surgeon (a lieutenant colonel) over a bacon buttie or after a run around camp. Mutual respect meant everyone accepted that the junior soldier who ran for the blood was as essential as the surgeon who performed the laparotomy.

This cycle of service improvement did not just happen at Camp Bastion but also crossed continents. Once a week, a telephone conference ward round occurred between the Queen Elizabeth hospital in Birmingham (where the injured service personnel were repatriated to), Camp Bastion in Afghanistan, Basra medical facility in Iraq, UK headquarters, and the rehabilitation services at Hedley court. Things that could have been done better were fed back almost immediately. The speed of the cycle of change was incredible – but that could only happen with a Just Culture. A culture where Bastion medical facility could admit a case did not go well, the UK could make suggestions and Bastion can implement those changes, all in the space of a few days without a sense of shame or failure.[10] A Just Culture is one where every mistake is not automatically punished with an incident form or a disciplinary hearing but rather one where everyone is confident enough to speak and the leadership is confident enough to listen.

Summary

Survival from major injury of British military personnel has improved each year since 2002. Lessons learned by the Defence Medical Services over the last decade of conflict were not just about how to resuscitate better or debride wounds more thoroughly but also how to tease out the very best human factors from the teams on the ground. Much of this evolved seamlessly by multiple personnel suggesting multiple solutions and the headquarters having the confidence to listen and allow changes to happen. There were many facets to how these changes occurred but perhaps the human factors could be summed up as, 'Common Goals, Shared Risk and a Just Culture.' If these lessons could be captured in civilian healthcare, not just for trauma but all care, then maybe similar improvements in survival will be achieved.

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